

MONTHLY SCIENTIFIC REVIEW ON AVIAN INFLUENZA A (H5N1)

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Situation at a glance

- Avian influenza A(H5N1) is an infectious disease caused by an influenza A virus. From January 1, 2003, to September 29, 2025, a total of 991 human cases of avian influenza A(H5N1) and 476 deaths (a case fatality rate of 48%) have been reported to WHO from 24 countries.
- Since the beginning of the year, 18 human cases of A(H5N1) have been reported in Cambodia, including 9 deaths, and a total of 30 cases worldwide.
- No person-to-person transmission has been identified in any of these cases.

Scientific articles

This section presents relevant articles published on peer-reviewed scientific journals or pre-print platforms.

2025-10-29

Transcontinental Spread of HPAI H5N1 from South America to Antarctica via Avian Vectors.

Journal: Viruses

Authors: Ruifeng Xu, Minhao Gao, Nailou Zhang, Zhenhua Wei, Zheng Wang, Lei Zhang, Yang Liu, Zhenhua Zheng, Liulin Chen, Haitao Ding, Wei Wang

H5N1 detected in Antarctic brown skuas, linked to South American strains via avian migration, with a unique NA gene deletion, highlighting the need for increased surveillance.

[See details](#)

2025-10-29

Serological Evidence of Exposure to Eurasian-Lineage HPAI H5N1 Clade 2.3.4.4b in Wild Mammals in Ohio, USA, 2024-2025.

Journal: Viruses

Authors: Mohammad Jawad Jahid, Madison C Owsiany, Lauren M Smith, Bryant M Foreman, Zijjing Cao, Deborah L Carter, David E Stallknecht, Brendan Shirkey, Rebecca L Poulson, Jacqueline M Nolting

This study investigated H5N1 clade 2.3.4.4b spillover in Ohio's wild mammals, finding no active infections but detecting antibodies in raccoons and opossums, suggesting prior exposure without mortality. Seropositive animals were sampled near marshes with confirmed H5N1 in waterfowl, indicating potential mammalian adaptation and emphasizing the need for continued surveillance.

[See details](#)

2025-10-23

Metabolomic profiling and identification of potential biomarkers of highly pathogenic avian influenza (H5N1) in chicken.

Journal: Front Cell Infect Microbiol

Authors: Althaf Mohammed Kadamthodi, Anuradha Panwar, Akhila Hosur Shrungeswara, Periyasamy Vijayakumar, Thottethodi Subrahmanya Keshava Prasad, Ashwin Ashok Raut, Anamika Mishra

Metabolomic profiling of HPAI H5N1-infected chickens revealed significant alterations in lung and serum metabolites, including sphingosine, psychosine sulfate, and L-serine, implicating sphingolipid and tryptophan metabolism in pathogenesis. This study provides novel insights for therapeutic development.

[See details](#)

2025-10-29

Genetic Characterization and Pathogenesis of Highly Pathogenic Avian Influenza Virus A (H5N1) Isolated in Egypt During 2021-2023.

Journal: Viruses

Authors: Mina Nabil Kamel, Yassmin Moatasim, Basma Emad Aboulhoda, Mokhtar Gomaa, Ahmed El Taweel, Omnia Kutkat, Mohamed El Sayes, Mohamed GabAllah, Hend AbdAllah, Refaat M Gabre, Maha M AlKhazindar, Ahmed Kandeil, Pamela P McKenzie, Richard J Webby, Mohamed Ahmed Ali, Ghazi Kayali, Rabeh El-Shesheny

This study characterizes H5N1 viruses from Egypt (2021-2023), finding multiple introductions linked to migratory birds. Two strains showed high pathogenicity and transmissibility in chickens, highlighting the need for ongoing surveillance at the poultry-wild bird interface.

[See details](#)

2025-11-11

Comparative evaluation of different transport media for H5N1 highly pathogenic avian influenza virus.

Journal: Sci Rep

Authors: Baleshwari Dixit, Harshad Vinayakrao Murugkar, Shanmugasundaram Nagarajan, Manoj Kumar, Anjay Anjay, Manu Dixit, Arpita Shrivastav, Amit K Jha, Anjani K Mishra, R V Singh, Chakradhar Tosh

This study compared five transport media (PBS, 50% glycerol+PBS, NS, VTM, CVTM) for preserving H5N1 virus infectivity under field conditions. NS, PBS, and CVTM were most effective, economical, and easy to prepare. Virus survivability differed significantly in VTM between allantoic fluid and fecal samples.

[See details](#)

2025-10-17

Investigating environmental determinants and spatiotemporal dynamics of highly pathogenic avian influenza H5N1 outbreaks in India through machine learning.

Journal: Sci Rep

Authors: Suresh Kuralayanapalya Puttahonnappa, Jayashree Anandakumar, Nagendra Nath Barman, Raaga Rajkumar, Krishnamoorthy Paramanandham, Sharanagouda S Patil, Sanjay Lamba, Archana Veeranagouda Patil, Baldev Raj Gulati

This study uses geospatial analysis, machine learning, and remote sensing to assess HPAI H5N1 outbreaks in India, identifying winter and spring peaks and key environmental predictors. Ensemble modeling highlights high-risk regions in southern and northeastern India, aiding surveillance and policy development.

[See details](#)

2025-11-18

Modelling a potential zoonotic spillover event of H5N1 influenza.

Journal: BMC Public Health

Authors: Philip Cherian, Gautam I Menon

[See details](#)

2025-10-29

Tiger deaths in Vietnam due to infection with H5N1 highly pathogenic avian influenza virus bearing mutations associated with mammalian host adaptation.

Journal: Emerg Microbes Infect

Authors: Murasaki Amano, Nguyen Thi Nga, Nguyen Le Khanh Hang, Nguyen Dang Tho, Nguyen Thi Diep, Dam Thi Vui, Futoshi Hasebe, Haruka Abe, Le Thi Quynh Mai

The study investigates H5N1-HPAIV infections in 47 tigers and 3 leopards in Vietnam (2024), identifying a clade 2.3.2.1e strain with mammalian-adaptive mutations, including E627K in PB2, closely related to Cambodian human H5N1 strains. Continuous monitoring is recommended to prevent further transmission.

[See details](#)

2025-09-30

Circumpolar spread of avian influenza H5N1 to southern Indian Ocean islands.

Journal: Nat Commun

Authors: Augustin Clessin, François-Xavier Briand, Jérémy Tornos, Mathilde Lejeune, Camille De Pasquale, Romain Fischer, Florent Souchaud, Edouard Hirschaud, Samuel L Hong, Tristan Bralet, Christophe Guinet, Clive R McMahon, Béatrice Grasland, Guy Baele, Thierry Boulinier

H5N1 clade 2.3.4.4b reached Crozet and Kerguelen islands in 2024, causing marine mammal and seabird deaths. Phylogeographic analysis suggests independent introductions from South Georgia, not South Africa. Local transmission between species occurred, with some seals showing anti-H5 antibody response. This spread threatens Australia and sub-Antarctic wildlife, highlighting a gap in genomic surveillance.

[See details](#)

2025-10-21

RNA replicon vaccination confers long-lasting protection against H5N1 avian influenza in 23 zoo bird species.

Journal: Nat Commun

Authors: Marion Stettler, Stefan Hoby, Christian Wenker, Fabia Wyss, Elisabeth Heiderich, Lisa Buttica, Nicolas Ruggli, Karin Darpel, Gert Zimmer

A VSV replicon vaccine, VSVΔG(H5 mb), encoding a modified H5 hemagglutinin, elicited strong neutralizing antibody responses and full protection in chickens against lethal H5N1 challenge. Administered to 317 captive birds across 23 species, it showed no side effects, with 98.7% retaining significant antibody levels after one year, suggesting durable, broad protection against H5N1.

[See details](#)

2025-10-19

Evolution of antibody cross-reactivity to influenza H5N1 neuraminidase from an N2-specific germline.

Journal: Cell Host Microbe

Authors: Huibin Lv, Yang Wei Huan, Qi Wen Teo, Chunke Chen, Tossapol Pholcharee, Akshita B Gopal, Madison R Ardagh, Jessica J Huang, Ruipeng Lei, Xin Chen, Yuanxin Sun, Yun Sang Tang, Arjun Mehta, Mateusz Szlembarski, Kevin J Mao, Emily X Ma, Lucas E Wittenborn, Meixuan Tong, Lucia A Rodriguez, Letianchu Wang, Chris K P Mok, Nicholas C Wu

HB420, an antibody from a phage display library, cross-reacts with H3N2 and H5N1 neuraminidases, offering in vivo protection. Cryo-EM shows it targets the active site, mimicking sialic acid via a single Asp residue. The germline is N2-specific, gaining H5N1 cross-reactivity through somatic hypermutation, aiding broadly protective influenza vaccine development.

[See details](#)

2025-11-13

Ecology and spread of the North American H5N1 epizootic.

Journal: Nature

Authors: Lambodhar Damodaran, Anna S Jaeger, Louise H Moncla

The North American H5N1 panzootic, driven by nine introductions, rapidly spread via migratory Anseriformes. Domestic outbreaks stemmed from 46-113 wild bird introductions, lasting up to 6 months. Backyard birds showed earlier infection, suggesting early-warning potential. Enhanced wild bird surveillance and reduced wild-agriculture transmission are crucial for future outbreak prevention.

[See details](#)

2025-10-09

H5N1 influenza virus stability and transmission risk in raw milk and cheese.

Journal: Nat Med

Authors: Mohammed Nooruzzaman, Pablo Sebastian Britto de Oliveira, Salman L Butt, Nicole H Martin, Samuel D Alcaine, Stephen P Walker, Diego G Diel

H5N1 virus persists in raw-milk cheeses at pH 6.6 and 5.8 for up to 120 days, but not at pH 5.0. Ferrets fed contaminated raw milk became infected, but those fed cheese did not. This highlights potential risks of raw-milk cheese from contaminated milk and the need for mitigation measures.

[See details](#)

Relevant news

This section presents official reports from health agencies, manufacturers and press releases with reliable sources.

2025-11-17

Zoonotic influenza - Annual Epidemiological Report for 2023

Source: ECDC

Sporadic human infections with avian influenza virus subtypes A(H3N8), A(H5N1), A(H5N6), A(H9N2), A(H10N5) were reported globally by four countries for 2023.

[See details](#)

2025-11-18

Indiana tracks more avian flu outbreaks in poultry

Source: CIDRAP

Indiana reports increased H5N1 avian flu outbreaks in poultry, with significant cases in Elkhart and LaGrange counties, affecting over 100,000 birds. Nationwide, 83 flocks (36 commercial, 47 backyard) have been impacted, totaling 1.82 million birds, driven by migratory wild birds.

[See details](#)

2025-11-17

Quick takes: Avian flu death in Cambodia, return of US FluView

Source: CIDRAP

Cambodia reports 18th H5N1 case, source unknown; reassortant strain detected. US FluView resumes, showing low but increasing seasonal flu activity, with H3N2 dominating.

[See details](#)

Clinical Studies

This section presents relevant clinical trials.

2025-02-23

H5N1 Milk Detection Study

Status: Recruiting

Sponsor(s): Emory University, National Institute of Allergy and Infectious Diseases (NIAID)

The purpose of this study is to determine whether drinking pasteurized milk (milk heated to kill harmful germs) that contains inactive particles of a flu virus called A(H5) could lead to the detection of the virus in the nose or throat. Inactive particles are not capable of causing disease. The results will help the Centers for Disease Control and Prevention (CDC) better understand how milk consumption could affect flu surveillance. Investigators also want to see if the body produces antibodies in response to this milk consumption.

[See details](#)

2024-04-16

A Study to Find and Confirm the Dose and Assess Safety, Reactogenicity and Immune Response of a Vaccine Against Pandemic H5N1 Influenza Virus in Healthy Younger and Older Adults

Status: Recruiting

Sponsor(s): GlaxoSmithKline (Group)

The aim of this study is to evaluate the safety, reactogenicity and immunogenicity of the Flu Pandemic messenger RNA (mRNA) vaccine (including dose-finding and dose-confirmation) administered in healthy adults 18 to 85 years of age.

[See details](#)

Guidelines and practical information

This section lists official manuals of recommendations for clinical practice or public health policy published by leading health organizations.

January 2024	Interim Guidance for Employers to Reduce Exposure to Avian Influenza A Viruses for People Working with Animals
August 2024	Practical interim guidance to reduce the risk of infection in people exposed to avian influenza viruses
June 2024	Highly Pathogenic Avian Influenza A(H5N1) Virus in Animals: Interim Recommendations for Prevention, Monitoring, and Public Health Investigations (CDC)
June 2024	Prevention and Antiviral Treatment of Avian Influenza A Viruses in People (CDC)
May 2024	Avis du COVARS du 24 mai 2024 - Point sur la situation liée au virus influenza H5N1 (MESRI)
December 2023	Considerations for emergency vaccination of wild birds against high pathogenicity avian influenza in specific situations (WOAH)
June 2023	Enhanced surveillance of severe avian influenza virus infections in hospital settings in the EU/EEA (ECDC)
January 2022	Guidelines for the clinical management of severe illness from influenza virus infections (WHO)
December 2021	Avis relatif à la prévention de la transmission à l'homme des virus influenza porcins et aviaires (HCSP)

Fact sheets

Transmission

Influenza A viruses are segmented, negative-sense single-stranded RNA viruses, members of the Orthomyxoviridae family. The antigenic diversity of these viruses arises from two surface glycoproteins: hemagglutinin (HA) and neuraminidase (NA). Combinations of these proteins create numerous influenza subtypes, with currently 18 HA and 11 NA subtypes recognized in the environment. Although avian influenza viruses spread mainly among waterfowl, particularly Anseriformes and Charadriiformes, as well as in other susceptible bird species such as Galliformes. Unlike most other avian influenza viruses, A(H5N1) 2.3.4.4b has infected more than 200 mammal species and they can occasionally infect humans but no sustained human-to-human transmission has been identified.

Diagnosis

Appropriate samples for influenza tests should be rapidly taken and processed from patients with a relevant exposure history within ten days preceding symptom onset. A(H5N1) viruses have been detected in raw milk from infected dairy cows in some locations.

Symptoms

The incubation period for A(H5N1) infection is typically two to five days after the last known exposure. A(H5N1) influenza virus infection can cause a range of diseases in humans, from mild to severe, and in some cases, it can even be fatal. Symptoms are primarily respiratory, including fever, malaise, cough, sore throat, and muscle aches. Other early symptoms may include conjunctivitis and other non-respiratory symptoms. The infection can quickly progress to severe respiratory illness and neurological changes. A(H5N1) virus has also been detected in asymptomatic individuals.

Treatment

Influenza patients should be managed properly to prevent severe illness and death. Patients with laboratory-confirmed should be treated with antiviral medicines like oseltamivir as soon as possible.

Vaccination

Vaccine development leading to the licensure of three H5N1 vaccines - clade 1 and 2.1 - by the FDA and EMA under the trade name Audenz® / Aflunox®, Preprandix® / Pumarix®, and Foclivia® / Adjupanix®.